UNITED STATES DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL MARINE FISHERIES SERVICE
Northwest Region
7600 Sand Point Way N.E., Bldg. 1
Seattle, WA 98115

Refer to:
2003/00778

February 2, 2004

Rick Yarde
Environmental Protection Specialist
Department of Energy
Bonneville Power Administration
P.O. Box 3621
Portland, OR 97208-3621

Re: Endangered Species Act Section 7 Formal Consultation and Magnuson-Stevens Fishery and Conservation Management Act Essential Fish Habitat Consultation on the Effects of the Trout Creek Berm Removal and Channel Restoration Project, Trout Creek Subbasin, Jefferson County, Oregon

Dear Mr. Yarde:

Enclosed is a biological opinion (Opinion) prepared by NOAA's National Marine Fisheries Service (NOAA Fisheries) pursuant to section 7 of the Endangered Species Act (ESA) on the effects of Bonneville Power Administration funding the proposed Trout Creek Berm Removal and Channel Restoration Project. In this Opinion, NOAA Fisheries concludes that the proposed action is not likely to jeopardize the continued existence of ESA-listed Middle Columbia River (MCR) steelhead (*Oncorhynchus mykiss*). As required by section 7 of the ESA, NOAA Fisheries includes reasonable and prudent measures with nondiscretionary terms and conditions that are necessary to minimize the impact of incidental take associated with this action.

This document also serves as consultation on essential fish habitat (EFH) pursuant to section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act and implementing regulations at 50 CFR Part 600. The Trout Creek subbasin has been designated as EFH for chinook salmon (*O. tshawytscha*) and coho salmon (*O. kisutch*).

If you have any questions regarding this consultation please contact Eric Murray of my staff in the Eastern Oregon Habitat Branch at 541.975.1835, ext. 222.

Sincerely,

for Michael R Crouse

D. Robert Lohn
Regional Administrator

cc: Tom Nelson, ODFW
Jerry Cordova, USFWS

Endangered Species Act - Section 7 Consultation
Biological Opinion

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Magnuson-Stevens Fishery Conservation and Management Act
Essential Fish Habitat Consultation

Trout Creek Berm Removal and Channel Restoration Project,
Trout Creek Subbasin,
Jefferson County, Oregon

Agency:	Bonneville Power Administration
Consultation Conducted By:	National Marine Fisheries Service, Northwest Region
Date Issued:	February 2, 2004
Issued by:	for Michael R Crouse D. Robert Lohn Regional Administrator
Refer to:	**2003/00778**

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1. INTRODUCTION

The Endangered Species Act (ESA) of 1973 (16 USC 1531-1544), as amended, establishes a national program for conserving threatened and endangered species of fish, wildlife, plants, and the habitat on which they depend. Section 7(a)(2) of the ESA requires Federal agencies to consult with NOAA's National Marine Fisheries Service (NOAA Fisheries) and U.S. Fish and Wildlife Service (together "Services"), as appropriate, to ensure that their actions are not likely to jeopardize the continued existence of endangered or threatened species or adversely modify or destroy their designated critical habitats. This biological opinion (Opinion) is the product of an interagency consultation pursuant to section 7(a)(2) of the ESA and implementing regulations 50 CFR 402.

The analysis also fulfills the essential fish habitat (EFH) requirements under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), established procedures designed to identify, conserve, and enhance EFH for those species regulated under a Federal fisheries management plan. Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH (section 305(b)(2)).

The Bonneville Power Administration (BPA) proposes to fund the Trout Creek Berm Removal and Channel Restoration Project (Project). This Project has been planned by the Oregon Department of Fish and Wildlife (ODFW) and the Jefferson County Soil and Water Conservation District (SWCD). The administrative record for this consultation is on file at the Oregon State Habitat Office.

1.1 Background and Consultation History

NOAA Fisheries received a letter requesting formal ESA section 7 consultation for the Project on June 18, 2003. The BPA determined that this Project was "likely to adversely affect" (LAA) Middle Columbia River (MCR) steelhead. A biological assessment (BA) and EFH assessment for this Project were also received at this time. NOAA Fisheries was unable to initiate formal consultation because the BA was incomplete, and on July17, 2003, NOAA Fisheries responded with a letter requesting additional information on the effects of this Project to MCR steelhead. The BPA and ODFW provided additional information on August 4, 2003, including a watershed assessment, and invited NOAA Fisheries staff on a site visit. Representatives from NOAA Fisheries met with representatives from the BPA, ODFW, and Jefferson County SWCD on September 17, 2003, to tour the proposed Project site and discuss information needs. On October 9, 2003, NOAA Fisheries sent a letter to the BPA clarifying the additional information that would be needed to complete this consultation.

On December 1, 2003, the BPA provided an updated BA with a letter requesting formal consultation on the Project. Formal consultation was initiated by NOAA Fisheries on December 1, 2003.

The objective of the Opinion contained in this document is to determine whether the Project is likely to jeopardize the continued existence of MCR steelhead.

The objective of the EFH consultation is to determine whether the Project may adversely affect designated EFH, and to recommend conservation measures to avoid, minimize, or otherwise offset potential adverse effects to EFH resulting from the emergency action.

1.2 Proposed Action

The proposed Project involves removing existing berms created as flood control structures, reshaping the channel of Trout Creek, constructing numerous rock structures, and constructing off-channel ponds, alcoves, and sloughs, at two private property sites along Trout Creek. These activities will be complemented by development of a riparian conservation easement by enrolling riparian buffer areas in the Farm Service Agency's (FSA) Conservation Reserve Enhancement Program (CREP). Activities associated with this program include construction of a fence to restrict livestock, planting native trees, grasses and shrubs, and constructing off-site watering facilities for livestock. These activities will follow the terms and conditions from the NOAA Fisheries' programmatic biological opinion on the CREP (refer to NOAA Fisheries Log #6112).[1]

The proposed activities will be phased, occurring over a four-year period from 2003 to 2007. The Project will remove berms and reshape the channel and floodplain of approximately nine miles of Trout Creek. At each site, approximately one mile would be treated each year. A timeline for the proposed activities is provided in Appendix B of this document. Maps of portions of the Project area with proposed channel realignments and instream structure locations are provided in Appendix A. Although these maps do not represent the entire Project area, they provide an example of the types of restorative treatments that will be performed as part of the proposed action. The construction activities will require the use of several types of heavy machinery including tracked excavators, rubber-tired backhoes, bulldozers, and dumptrucks. All instream work will occur during the in-water work period for the Project, July 1 to October 31. The Project activities are fully described in the BA and briefly described below.

Nye Site

The present channel of Trout Creek at the Nye site is relatively straight, extensively bermed, and offers little habitat complexity for aquatic species. The gradient of the stream channel in this area is less than 1%, and before anthropogenic disturbance, the stream channel displayed a more sinuous morphology. A new, E-type channel (Rosgen 1996) will be constructed by excavating areas in the floodplain. Existing berms will be removed and rock structures will be created to stabilize the new channel. One hundred and eleven J-hooks and 68 cross vane structures will be constructed with large rock. The present channel will be blocked with fourteen channel plugs to prevent Trout Creek from returning to its former channel.

[1]Available at: http://www.nwr.noaa.gov/1habcon/habweb/bo/crep1toc.htm

Berms, created for flood control, will be removed from the floodplain. Material from the berms and from the newly-excavated channel will be moved by heavy machinery. Most of this material will be used to fill the existing channel and low areas within the floodplain. The width of the floodplain will be determined by the width of the flood-prone area of each cross-section. Sloughs and ponds may be created in the floodplain to increase water storage and encourage the formation of wetland habitat.

Priday Site

The channel of Trout Creek in the Priday site is similar to the channel at the Nye site. The stream has been bermed and straightened and provides little habitat for aquatic species. The proposed Project activities involve reshaping the existing straightened channel to a more sinuous shape with numerous instream structures to maintain channel stability. The Project information provided in the BA indicates that the newly-constructed channel will be composed of reaches of E and C-type channels (Rosgen 1996). One hundred eighteen J-hooks and 68 cross veins will be constructed with large rock.

Fish Salvage

Where stream channels will be relocated, juvenile MCR steelhead may become stranded during draining of the old channel. Due to the very low flows in the Project area during the construction period, the chance of this occurring is low but not discountable. Fish salvage equipment will be available during construction in case stranded fish are discovered. If this occurs, the area will be blocked with nets and seined to remove as many juvenile fish as possible. Following seining, an ESA-certified backpack electroshocker would be used to collect the remaining fish. Captured fish will be placed in a oxygenated buckets and transported to the newly-constructed channel.

Revegetation

Revegetation efforts have been planned for the majority of the Project areas. The revegetation will be part of the CREP effort and will involve seeding of the area with native grasses and planting of woody vegetation. Planting techniques will include trenching, which entails digging a trench with an excavator and placing live cuttings into the trench, and stinging, a technique in which a excavator punches holes in the soil with a mounted steel bar and plantings are placed in the hole. Hand planting of rooted stock and seedings will also occur. Species used for revegetation will include willow, red-osier dogwood, cottonwood, and alder. Planting will occur in the in the fall or early spring following the construction activities for that year. Follow-up measures, such as watering, will occur during the first year after planting.

Other CREP Activities

Fences will be constructed to exclude livestock from the stream and adjacent riparian area. Approximately 157 acres will be excluded from the livestock on the Nye site with an average width of 217 feet. Approximately 100 acres on the Priday site will be excluded with an average buffer width of 235 feet on each side of the stream.

Off-channel water developments will be constructed outside of the CREP buffers. Springs or shallow wells will be developed to provide water to livestock that will lose access to the stream due to the fencing.

2. ENDANGERED SPECIES ACT

2.1 Biological Opinion

2.1.1 Biological Information

The MCR steelhead ESU was listed as threatened under the ESA by NOAA Fisheries on March 25, 1999 (64 FR 14517). Protective regulations for MCR steelhead were issued under section 4(d) of the ESA on July 10, 2000 (65 FR 42422). Biological information concerning the MCR steelhead is found in Busby *et al.* (1996). The major drainages in the MCR steelhead ESU are the Deschutes, John Day, Klickitat, Umatilla, Walla Walla, and Yakima river systems. NOAA Fisheries (2003) has indicated that the five-year average (geometric mean) abundance of natural MCR steelhead was up from previous years' basin estimates in the ESU. The Klickitat, Yakima, Touchet, and Umatilla systems are all well below their interim abundance targets. The John Day and Deschutes are at or above their interim targets for abundance, however there is significant concern regarding the straying of fish into the Deschutes system from other ESUs (Table 1). The productivity estimate (λ) of the MCR ESU is approximately 0.98, indicating that the productivity of MCR steelhead is slightly below its target of 1.0. NOAA Fisheries' biological review team (BRT) has determined that the MCR ESU is likely to become endangered because of stock abundance and long-term productivity being depressed within the ESU.

MCR steelhead in Trout Creek subbasin are genetically allied with other steelhead, which are typically summer-run stocks (Busby *et al.*, 1996). MCR steelhead are widely distributed throughout the Trout Creek subbasin, and are found throughout the length of the creek. A redd count survey done in 2000 by ODFW determined that 88% of steelhead spawning activity took place in the upper reaches of the creek, above Ashwood Bridge at river mile 29.1 (Nelson, 2000). During low flow years, like 2001, the spawning activity occurs downstream, as shown by an ODFW survey which found 62% of the steelhead spawned below the Ashwood Bridge in 2001 (Nelson 2001).

Steelhead in the basin are late-run stocks that enter the basin in early February with a peak in-migration in late March. Spawning typically begins in April and continues though May. Juveniles typically rear in freshwater through the following year, emigrating from February through May after two years of freshwater residence. Adults return after one or two years in the ocean. Additional life history information for MCR steelhead ESU can be found in Busby *et al.* (1996).

Table 1. Interim abundance targets for the MCR steelhead ESU (adapted from NOAA Fisheries 2003).

ESU/Spawning Aggregations*	Interim Abundance Targets	Interim Productivity Objective
Walla-Walla	2,600	Middle Columbia ESU populations are currently well below recovery levels. The geometric mean Natural Replacement Rate (NRR) will therefore need to be greater than 1.0
Umatilla	2,300	
Deschutes (Below Pelton Dam Complex)	**6,300**	
John Day		
North Fork	2,700	
Middle Fork	1,300	
South Fork	600	
Lower John Day	3,200	
Upper John Day	2,000	

*Population in bold is addressed in this Opinion

Essential features of the adult spawning, juvenile rearing, and adult and migratory habitat for this species are: Substrate, water quality, water quantity, water temperature, water velocity, cover/shelter, food (juvenile only), riparian vegetation, space, and safe passage conditions. (Bjornn and Reiser, 1991; NOAA Fisheries, 1996b; Spence *et al.*, 1996). The essential features that the proposed Project may affect are: Substrate, water quality, water temperature, water velocity, cover/shelter, food, riparian vegetation, and safe passage conditions.

2.1.2 Evaluating Proposed Actions

The standards for determining jeopardy are set forth in section 7(a)(2) of the ESA as defined by 50 CFR Part 402 (the consultation regulations). In conducting analyses of habitat-altering actions under section 7 of the ESA, NOAA Fisheries uses the following steps: (1) Consider the status and biological requirements of the species; (2) evaluate the relevance of the environmental baseline in the action area to the species' current status; (3) determine the effects of the proposed or continuing action on the species; (4) consider cumulative effects; and (5) determine whether the proposed action, in light of the above factors, is likely to appreciably reduce the likelihood of species survival in the wild or adversely modify its critical habitat. In completing this step of the analysis, NOAA Fisheries determines whether the action under consultation, together with all cumulative effects when added to the environmental baseline, is likely to jeopardize the continued existence of the ESA-listed species or result in destruction, adversely modify their critical habitat, or both.

NOAA Fisheries has developed guidelines for basin-level, multispecies recovery planning on which individual, species-specific recovery plans can be founded. "Basin-level" encompasses habitat, harvest, hatcheries, and hydro. The recovery planning analysis is contained in the document entitled "*Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy*" (hereafter, the Basinwide Recovery Strategy [Federal Caucus 2000]). The Basinwide Recovery Strategy will be used to guide recovery planing for MCR steelhead. The recovery plan will provide the particular statutorily-required elements of recovery goals, criteria, management actions, and time estimates that are not developed in the Basinwide Recovery Strategy.

Among other things, the Basinwide Recovery Strategy calls for restoration of degraded habitats on a priority basis to produce significant measurable benefits for listed anadromous and resident fish. Immediate and long-term priorities for restoration measures relevant to this consultation include the following general habitat improvements for tributary reaches:

- Restoring tributary flows.
- Addressing passage obstructions.
- Protecting the currently productive habitat.
- Increasing the quantity and quality of aquatic and riparian habitats.
- Improve water quality.

Until the species-specific recovery plans are developed, the Basinwide Recovery Strategy provides the best guidance for judging the significance of an individual action relative to the species-level biological requirements

2.1.3 Biological Requirements

The first step the NOAA Fisheries uses when applying the ESA section 7(a)(2) to listed steelhead is to define the species' biological requirements that are most relevant to each consultation. NOAA Fisheries also considers the status of the listed species taking into account population size, trends, distribution, and genetic diversity. To assess the status of the listed species, NOAA Fisheries starts with the determinations made in its decision to list MCR steelhead for ESA protection and also considers new data available that is relevant to the determination.

For this consultation, revelvant the biological requirements are improved habitat characteristics that function to support successful adult and juvenile migration, spawning and rearing. MCR steelhead survival in the wild depends upon the proper functioning of certain ecosystem processes, including habitat formation and maintenance. Restoring functional habitats depends largely on allowing natural processes to increase their ecological function, while at the same time removing adverse impacts of current practices. In conducting analyses of habitat-altering actions and essential habitat elements, NOAA Fisheries defines the biological requirements in terms of a concept called Properly Functioning Condition (PFC) and uses a "habitat approach" in its analysis (NOAA Fisheries 1999). Returns of adult MCR steelhead to the Deschutes River Basin have improved to some degree since the species was listed, however, straying of hatchery

fish into the basin till remains a concern (NOAA Fisheries 2003). Within the action area, high summer water temperatures, lack of habitat complexity, and dewatering of Trout Creek continue to limit production of MCR steelhead.

2.1.4 Environmental Baseline

The environmental baseline is an analysis of the effects of past and ongoing human-caused and natural factors leading to the status of the species or its habitat and ecosystem within the action area. The "action area" is defined as "all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action" (50 CFR 402.02). The action area for this consultation is the Nye and Priday project sites and the extent to which downstream effects of the proposed action are likely to occur. Due to the large amount of bare soil to be exposed during this Project, downstream effects could extend up to three miles.

In general, the environment for listed species in the Columbia River Basin (CRB), including those that migrate past or spawn upstream from the action area, has been dramatically affected by the development and operation of the Federal Columbia River Power System (FCRPS). Storage dams have eliminated mainstem spawning and rearing habitat, and have altered the natural flow regime of the Snake and Columbia Rivers, decreasing spring and summer flows, increasing fall and winter flow, and altering natural thermal patterns. Power operations cause fluctuation in flow levels and river elevations, affecting fish movement through reservoirs, disturbing riparian areas and possibly stranding fish in shallow areas as flows recede. The four dams in the migration corridor of the Columbia River kill or injure a portion of the smolts passing through the area. The low velocity movement of water through the reservoirs behind the dams slows the smolts' journey to the ocean and enhances the survival of predatory fish (Independent Scientific Group 1996, National Research Council 1996). Formerly complex mainstem habitats in the Columbia, Snake, and Willamette Rivers have been reduced, for the most part, to single channels, with floodplains reduced in size, and off-channel habitats eliminated or disconnected from the main channel (Sedell and Froggatt 1984; Independent Scientific Group 1996; and Coutant 1999). The amount of large woody debris in these rivers has declined, reducing habitat complexity and altering the rivers' food webs (Maser and Sedell 1994).

Other human activities that have degraded aquatic habitats or affected native fish populations in the CRB include stream channelization, elimination of wetlands, construction of flood control dams and levees, construction of roads (many with impassable culverts), timber harvest, splash dams, mining, water withdrawals, unscreened water diversions, agriculture, livestock grazing, urbanization, outdoor recreation, fire exclusion/suppression, artificial fish propagation, fish harvest, and introduction of non-native species (Henjum *et al.* 1994; Rhodes *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997). In many watersheds, land management and development activities have: (1) Reduced connectivity (*i.e.*, the flow of energy, organisms, and materials) between streams, riparian areas, floodplains, and uplands; (2) elevated fine sediment yields, degrading spawning and rearing habitat; (3) reduced large woody material that traps sediment, stabilizes streambanks, and helps form pools; (4) reduced vegetative

canopy that minimizes solar heating of streams; (5) caused streams to become straighter, wider, and shallower, thereby reducing rearing habitat and increasing water temperature fluctuations; (6) altered peak flow volume and timing, leading to channel changes and potentially altering fish migration behavior; and (7) altered floodplain function, water tables and base flows (Henjum *et al.* 1994; McIntosh *et al.* 1994; Rhodes *et al.* 1994; Wissmar *et al.* 1994; National Research Council 1996; Spence *et al.* 1996; and Lee *et al.* 1997).

To address problems inhibiting salmonid recovery in CRB tributaries, the Federal resource and land management agencies developed the *All H Strategy* (Federal Caucus 2000). Components of the *All H Strategy* commit these agencies to increased coordination and a fast start on protecting and restoring.

The Trout Creek subbasin combines multiple drainages and drains the North Slope of the Ochoco Mountains, east of Cougar Rock. Trout Creek is the largest eastside tributary of the Deschutes River. This includes 115.5 miles of perennial streams and 41.2 miles of mapped intermittent streams. Predominant management activities in this subbasin include timber management, domestic water supply, recreation, agriculture, and livestock use. Much of the agriculture is irrigated with water diverted from Trout Creek or its tributaries. Water withdrawal, rapid runoff due to poor vegetative cover in the uplands, and high summer water temperatures typically reduce the flow in Trout Creek to zero in the summer (Watershed Professionals Network 2002).

Portions of stream reaches are no longer interacting with their floodplains. Many stream channels have been downcut, are headcutting, or are gullying. These channel changes this can lower the water table, change the riparian vegetation composition, accelerate streambank erosion, simplify aquatic habitats, and change the hydraulic regime. Low pool frequencies and high stream sedimentation have reduced the availability of high quality spawning habitat in the subbasin. Temperatures regularly exceed 58° F. Densities of steelhead and redband trout are extremely low in the Trout Creek subbasin.

Environmental baseline conditions within the action area were evaluated for the subject actions at the project level and watershed scales. The results of this evaluation, based on the "Matrix of Pathways and Indicators" (MPI) described in *Making Endangered Species Act Determinations of Effect for Individual or Grouped Actions at the Watershed Scale* (NOAA Fisheries 1996a), follow. This method assesses the current condition of instream, riparian, and watershed factors that collectively provide properly functioning aquatic habitat essential for the survival and recovery of the species.

Within the Trout Creek subbasin, seven of the habitat indicators in the MPI were rated as "functioning at risk" and include: Chemical contamination/nutrients, physical barriers, substrate embeddedness, pool quality, streambank condition, drainage network increase, road density and location. Eleven of the 18 indicators were rated as "not properly functioning" and include temperature, sediment, large woody debris sediment/turbidity, pool frequency, off-channel habitat, refugia, width/depth ratio, floodplain connectivity, peak/base flow, riparian reserves and

disturbance history. No habitat indicator was rated was rated as "properly functioning." This information is summarized in Table 2.

2.1.5 Analysis of Effects

Effects of the action are defined as: "The direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are interrelated or interdependent with the action, that will be added to the environmental baseline" (50 CFR 402.02). Direct effects occur at the Project site and may extend upstream or downstream based on the potential for impairing the value of habitat for meeting the species' biological requirements. Indirect effects are defined in 50 CFR 402.02 as "those that are caused by the proposed action and are later in time, but still are reasonably certain to occur." They include the effects on listed species or habitat of future activities that are induced by the proposed action and that occur after the action is completed. "Interrelated actions are those that are part of a larger action and depend on the larger action for their justification" (50 CFR 402.02). "Interdependent actions are those that have no independent utility apart from the action under consideration" (50 CFR 402.02).

In the jeopardy analysis, NOAA Fisheries evaluates the effects of proposed actions on listed species and seeks to answer the question of whether the species can be expected to survive with an adequate potential for recovery.

Activities Involving In-water Work

The BPA has determined that the proposed Project is LAA MCR steelhead. Activities involving in-water and near-water construction (new channel excavation) will cause short-term adverse habitat effects and potentially result in harassment or harm of MCR steelhead juveniles. These activities will require instream operation of heavy machinery and exposure of large quantities of bare soil. This will produce sediment plumes sufficient to cause harm or harassment of MCR steelhead during construction activities and potentially during subsequent high flow events. Adverse effects to listed salmonids from these proposed activities include exposure to suspended sediments (turbidity) and contaminants resulting from construction, and behavioral changes resulting from elevated turbidity level (Sigler *et al.* 1984, Berg and Northcote 1985, Whitman *et al.* 1982, Gregory 1988), during in-water construction.

Suspended sediment and turbidity influences on fish reported in the literature range from beneficial to detrimental. Elevated total suspended solids (TSS) conditions have been reported to enhance cover conditions, reduce piscivorus fish/bird predation rates, and improve survival. Elevated TSS conditions have also been reported to cause physiological stress, reduce growth, and adversely affect survival. Of key importance in considering the detrimental effects of TSS on fish are the frequency and the duration of the exposure, not just the TSS concentration.

Table 2. Summary of Watershed Conditions in the Action Area

MPI Pathways	MPI Indicators	Watershed and Parameter Condition[1]
		Trout Creek
Water Quality	Temperature	NPF
	Sediment	NPF
	Chemical Contaminants/ Nutrients	FAR
Access	Physical barriers	FAR
Habitat Elements	Substrate Embeddedness	FAR
	Large Woody Debris	NPF
	Pool Frequency	NPF
	Pool Quality	FAR
	Off Channel Habitat	NPF
	Refugia	NPF
Channel Conditions & Dynamics	Width/depth ratios	NPF
	Streambank Condition	FAR
	Floodplain connectivity	NPF
Flow/ Hydrology	Change in Peak Base Flow	NPF
	Drainage Network Increase	FAR
Watershed Condition	Road Density and Location	FAR
	Disturbance History	NPF
	Riparian Reserves	NPF

[1] The condition of each MPI parameter is indicated in the following manner:
PF = properly functioning, FAR= functioning at risk, NPF= not properly functioning, U=data unavailable

Behavioral avoidance of turbid waters may be one of the most important effects of suspended sediments (DeVore *et al.* 1980, Birtwell *et al.* 1984, Scannell 1988). Salmonids have been observed to move laterally and downstream to avoid turbid plumes (McLeay *et al.* 1984, 1987, Sigler *et al.* 1984, Lloyd 1987, Scannell 1988, Servizi and Martens 1991). Juvenile salmonids

tend to avoid streams that are chronically turbid, such as glacial streams or those disturbed by human activities, unless the fish need to traverse these streams along migration routes (Lloyd *et al.* 1987). In addition, a potentially positive reported effect is providing refuge and cover from predation (Gregory and Levings 1988).

Fish that remain in turbid, or elevated TSS, waters experience a reduction in predation from piscivorus fish and birds (Gregory and Levings 1998). In systems with intense predation pressure, this provides a beneficial trade off (*e.g.*, enhanced survival) to the cost of potential physical effects (*e.g.*, reduced growth). Turbidity levels of about 23 Nephalometric Turbidity Units (NTU) have been found to minimize bird and fish predation risks (Gregory 1993). Exposure duration is a critical determinant of the occurrence and importance of physical or behavioral effects (Newcombe and MacDonald 1991). Salmonids have evolved in systems that periodically experience short-term pulses (days to weeks) of high suspended sediment loads, often associated with flood events, and are adapted to such high pulse exposures. Adult and larger juvenile salmonids may be little affected by the high concentrations of suspended sediments that occur during storm and snowmelt runoff episodes (Bjornn and Reiser 1991). However, research shows that chronic exposure can cause physiological stress responses that can increase maintenance energy and reduce feeding and growth (Redding *et al.* 1987, Lloyd 1987, Servizi and Martens 1991).

Turbidity at moderate levels can adversely affect primary and secondary productivity and at high levels can injure and kill adult and juvenile fish, and may also interfere with feeding (Spence *et al.* 1996). Newly-emerged salmonid fry may be vulnerable to even moderate amounts of turbidity (Bjornn and Reiser 1991). Other behavioral effects on fish, such as gill flaring and feeding changes, have been observed in response to pulses of suspended sediment (Berg and Northcote 1985). Fine, redeposited sediments also have the potential to adversely affect primary and secondary productivity (Spence *et al.* 1996), and to reduce incubation success (Bell 1991) and cover for juvenile salmonids (Bjornn and Reiser 1991).

Increased sedimentation may also lead to increased embeddness of spawning substrates downstream of the Project. Instream work scheduled for this Project will take place during the in-water window for the area (July 1 to October 31). Due to the typically low flows present in the individual project areas during this time, sedimentation rates are expected to be minimized. However, due to the large scale of each years proposed activities and the large amount of bare soil to be exposed, some sedimentation of substrates of downstream reaches will occur. Disturbance of riparian vegetation will result from operation of heavy machinery near the stream and could lead to decreased shade, increased water temperatures, and decreased streambank stability until riparian vegetation is re-established.

As with all construction activities, accidental release of fuel, oil, and other contaminants may occur. Operation of the back-hoes, excavators, and other equipment requires the use of fuel, lubricants, *etc.*, which, if spilled into the channel of a waterbody or into the adjacent riparian zone, can injure or kill aquatic organisms. Petroleum-based contaminants, such as fuel, oil, and some hydraulic fluids, contain poly-cyclic aromatic hydrocarbons (PAHs), which can be acutely

toxic to salmonids at high levels of exposure and can also cause chronic lethal and acute and chronic sublethal effects to aquatic organisms (Neff 1985).

Habitat Effects of Channel Realignment and Instream Structures

The proposed Project will improve MCR steelhead habitat by increasing the total stream length in the Project areas and increasing habitat complexity. The constructed stream channel will be more similar to the channel that existed before human disturbance. The stream channel will reconnect with its floodplain and thus be able to dissipate energy more efficiently during flood events. Increased water storage in the floodplain could result in some increase in base flows during summer.

Although the above-mentioned effects will improve MCR steelhead habitat, NOAA Fisheries is concerned that if the channel realignment or instream structures fail during high flow events, MCR steelhead and their habitat in and downstream of the Project sites will be harmed.

Complete channel realignment is an aggressive restoration technique. Digging a new stream channel and diverting a live stream into it is disruptive to the landscape and the animals and plants that live there (Sampson 2001). The newly-constructed channel may fail during subsequent high flow events. The channel may return to its pre-Project channel or channel avulsions may cut off the constructed meanders resulting in a relatively straight channel with little fish habitat complexity. The former is more likely to occur when floodplain roughness is low because floodplains are reshaped or cleared and devoid of vegetation and large woody debris. For the proposed Project, the chance of channel avulsion will be greatest during the first year after channel construction and will decrease as riparian vegetation becomes established, increasing floodplain roughness.

Planning channel realignment projects is difficult, defining the appropriate planform geometry and meander size for the new stream channel is complicated (Brookes 1990, Rinaldi and Johnson 1997). Modifications of proper channel planform geometry can cause a failure of the restoration design (Rinaldi and Johnson 1997). Restoration planners must consider how past disturbances such as deforestation, intensive agricultural, and channelization have changed the sediment transport process in the stream. These activities often cause increased sediment loads to streams. An increase of sediment or bedload material may result in increased width, slope, and meander wavelength and a decrease in sinuosity and stream depth (Brookes 1987). Rinaldi and Johnson (1997) also stress that identification of unstable stream reaches as a consequence of disturbed basin conditions is crucial to the success of meander restoration projects. Often, meander patterns are based on channel conditions before large scale human disturbance when stream channels were more stable. Reconstructed meander patterns need to accommodate the fact that stream flow and sediment transport may have been changed drastically in the past 100 years.

A similar situation exists with the use of the numerous rock instream structures associated with this Project. The use of instream structures is widely used throughout the Pacific Northwest to improve fish habitat, protect streambanks, and stabilize stream channels. Studies have shown that the placement of instream structures can result in greater habitat complexity and increase in

salmonid densities (House and Boehne 1986). However, excessive use of rock in stream channels, particularly those channels that typically do not contain large amounts of cobbles and boulders, can have unintended consequences. These consequences can include directing the channel thalweg to undesirable areas, erosion of downstream streambanks, or increasing width to depth ratios.

Durability of placed instream structures varies but a study by Roper *et al.* (1998) found that less than 20% of instream structures placed in a wide variety of stream sizes and locations failed during flood events although structures placed in higher order streams having a greater probability of failure. In the Project area, Trout Creek is a fourth order stream, and Roper *et al.* Found that fourth order streams had a 10 to 20% chance of failure of instream structures during a high flow event.

Projects similar to the proposed Project have been completed in northeastern Oregon during the past few years. Some of these projects such as the McCoy Meadows Project (NOAA Fisheries No.: 2002/00177)[2] have been successful so far, while others, such as the East Birch Creek Rehabilitation Project (NOAA Fisheries No.: 2001/00778)[3] required substantial follow-up work to correct design flaws.

Potential negative effects to MCR steelhead and their habitat from failure of either the newly-constructed channel or the instream structures could include sedimentation of downstream stream reaches and disruption of spawning activities. Because MCR steelhead spawn in the spring and high flows in the Trout Creek system occur in the spring, any adverse effects resulting from failures of instream structures or avulsions of the new channels are likely to disrupt spawning adult MCR steelhead or may entomb new redds. The severity of these effects would vary depending on the degree to which any of the Project elements fails. The phasing of the Project over several years will reduce any potential severity of negative effects if failures occur.

Effects of Fencing and Riparian Planting

As planted riparian vegetation begins to grow, stream shade will increase and summer water temperatures are expected to decrease. Greater streambank stability will also result from the recovery of the riparian plant community. Vegetation is a highly desirable stabilization method, but it must be established before the next major flood event (Brookes 1987).

A healthy riparian plant community can also increase the prey base for juvenile salmonids by increase the amount of terrestrial insect drop into the stream. Riparian vegetation also provides organic material directly to the stream, which makes up about 50% of the stream's nutrient energy supply for the food chain (Cummins 1974 *cited in* Platts 1991). This allochthonous

[2]Available at: http://www.nwr.noaa.gov/1publcat/bo/2002/200200177_mccoy_meadows_07-17-2002.pdf

[3]Available at: http://www.nwr.noaa.gov/1publcat/bo/2001/osb2001-0026-fec.pdf

material provides an important food source for aquatic insects that in turn become prey for salmonids.

Excluding livestock from the riparian areas will result in a decrease in trampling of streambanks and accelerated recovery of riparian vegetation. Fencing of sensitive riparian areas is an effective way of protecting riparian resources, fish habitats, and fish populations. Platts (1991) found that in 20 of 21 studies identified, stream and riparian habitats were degraded by livestock grazing, and these habitats improved when grazing was prohibited in the riparian zone.

Fish Salvage

Fish biologists will move all juvenile MCR steelhead from the instream isolation area by seining, or electroshocking which will cause stress to juvenile MCR steelhead. Stress approaching or exceeding the physiological tolerance limits of individual fish can impair reproductive success, growth, resistance to infectious diseases, and general survival (Wedemeyer *et al.* 1990). Many factors influence the relative effects of electrofishing on fish including conductivity of water, depth of water, substrate, and size of the fish. Additionally, the amount of time taken to complete electrofishing within the sample area, the frequency of sampling through time, crew efficiency, and operator skill have been identified as factors influencing the magnitude of electrofishing effects. Mechanical injury is also possible during netting, holding, or transporting. The small number of MCR steelhead to be affected by the fish salvage operation will not have population level effects.

Summary of Effects

NOAA Fisheries believes that the proposed action will cause some minor, short-term increases in stream turbidity and sedimentation rates in the action area. It is also possible that some juvenile MCR steelhead may die as a result of the instream work and the fish salvage operations. Vegetation disturbance or removal is expected to result in a temporary decrease in shade and avoidance of areas without sufficient cover. These effects will diminish over time as newly-planted riparian vegetation is established. MCR steelhead will avoid habitats negatively affected by construction activities in the short term until conditions improve. The proposed action is expected to provide long-term benefits to MCR steelhead by improving habitat conditions.

The proposed Project will have long-term benefits to MCR steelhead habitat. These include more stream habitat, greater habitat complexity, and a more natural stream channel morphology. The inclusion of the Project area in a CREP easement and the proposed revegetation efforts will drastically increase the rate of riparian recovery.

The best information available indicates that aggressive restoration project design such as that proposed in the subject Project is risky. However, NOAA Fisheries believes that the overall risk of project failure is low. Some elements of the Project may fail, but the adverse effects of these failure should be localized and minimal. The beneficial effects of the Project should outweigh any adverse effects resulting from failure of individual Project elements. In the long term, all habitat indicators should be maintained or improved.

2.1.6 Cumulative Effects

"Cumulative effects" are defined in 50 CFR 402.02 as those effects of "future State or private activities, not involving Federal activities, that are reasonably certain to occur within the action area of the Federal action subject to consultation."

Future Federal actions, including the ongoing operation of hydropower systems, hatcheries, fisheries, and land management activities are being reviewed through separate section 7 consultation processes. Federal actions that have already undergone section 7 consultations are included in the description of the environmental baseline in the action area.

The BPA identified no specific private or state actions that are reasonably certain to occur in the future that would affect MCR steelhead or their habitat within the action area. Ranching, farming, and timber harvest are ongoing in the Trout Creek subbasin and are reasonably certain to occur in the future. Water withdrawal for irrigation is also likely to continue and result in stretches of Trout Creek that are being de-watered in the summer.

2.1.7 Conclusion

NOAA Fisheries has determined that, when the effects of the subject action addressed in this Opinion are added to the environmental baseline and cumulative effects occurring in the action area, they are not likely to jeopardize the continued existence of MCR steelhead.

NOAA Fisheries' conclusion is based on the following considerations: (1) All instream work will occur during the in-water work window for this area (July 1 - October 31), and instream work will be limited to the amount described in the BA; (2) all disturbed soils will be replanted with native vegetation; and (3) an increase in fish habitat quality will result from the proposed action. Thus, the proposed action is not expected to impair currently properly functioning habitats, appreciably reduce the functioning of already impaired habitats, or retard the long-term progress of impaired habitats toward proper functioning condition essential to the long-term survival and recovery at the population or ESU scale.

2.1.8 Conservation Recommendations

Conservation recommendations are defined as "discretionary measures to minimize or avoid adverse effects of a proposed action on listed species or critical habitat or regarding the development of information" (50 CFR 402.02). Section 7 (a)(1) of the ESA directs Federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of the threatened and endangered species. NOAA Fisheries has the following conservation recommendations:

1. Carefully assess the need for the use of numerous rock structures in Trout Creek. Although these structures may increase channel stability, as they may also have unintended negative downstream habitat effects.

2. Take steps to increase floodplain roughness at points that are at risk for stream channel avulsion during subsequent high flow events. This could include placing large woody debris, planting extra vegetation at these sites, or using other bioengineering techniques.

3. When choosing the exact location and meander patterns for the new channel, consider geologic, hydrologic, hydraulic, and geometric features of the Project sites carefully. Consider the effects of human cause disturbances in the Trout Creek subbasin on flow and sediment transport in this stream. Ensure that the newly-constructed channel will efficiently transport sediment of various sizes through the Project stream reaches.

4. Final engineering plans for this Project should be reviewed by a hydrologist, geomorphologist, and engineer with experience in designing successful projects of this type.

5. Reserve funds in the Project budget to repair elements of the Project that may fail.

2.1.9 Reinitiation of Consultation

As provided in 50 CFR 402.16, reinitiation of formal consultation is required if: (1) The amount or extent of taking specified in the Incidental Take Statement is exceeded, or is expected to be exceeded; (2) new information reveals effects of the action may affect listed species in a way not previously considered; (3) the action is modified in a way that causes an effect on listed species that was not previously considered; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease, pending conclusion of the reinitiated consultation. This consultation covers Project activities as described in the proposed action section only through the end of calender year 2007. To reinitiate consultation, the BPA must contact the NOAA Fisheries Habitat Conservation Division, Oregon State Habitat Office and refer to NOAA Fisheries No. 2003/00778.

2.2 Incidental Take Statement

The ESA at section 9 [16 USC 1538] prohibits take of endangered species. The prohibition of take is extended to threatened anadromous salmonids by section 4(d) rule [50 CFR 223.203]. Take is defined by the statute as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct" [16 USC 1532(19)]. Harm is defined by regulation as "an act which actually kills or injures fish or wildlife. Such an act may include significant habitat modification or degradation which actually kills or injures fish or wildlife by significantly impairing essential behavior patterns, including, breeding, spawning, rearing, migrating, feeding or sheltering" [50 CFR 222.102]. Harass is defined as "an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding, or sheltering" [50 CFR 17.3]. Incidental take is defined as "takings that result from, but are not the purpose of, carrying out an otherwise lawful activity conducted by

the Federal agency or applicant" [50 CFR 402.02]. The ESA at section 7(o)(2) removes the prohibition from any incidental taking that is in compliance with the terms and conditions specified in a section 7(b)(4) incidental take statement [16 USC 1536].

An incidental take statement specifies the impact of any incidental taking of endangered or threatened species. It also provides reasonable and prudent measures that are necessary to minimize impacts and sets forth terms and conditions with which the action agency must comply to implement the reasonable and prudent measures.

2.2.1 Amount or Extent of the Take

The proposed action is reasonably certain to result in incidental take of juvenile MCR steelhead. NOAA Fisheries is reasonably certain the incidental take described here will occur because: (1) The listed species are known to occur in the action area; and (2) the proposed action is likely to cause impacts significant enough to cause death or injury, or impair feeding, breeding, migrating, or sheltering for the listed species.

Some level of incidental take is expected to result from instream work. The temporary increase in sediment and turbidity is expected to cause fish to avoid disturbed areas of the stream, both within and downstream of the Project area. Death or sublethal effects are likely if toxicants are introduced into the water. Take is also expected from riparian disturbance caused by the proposed Project. This nonlethal take is expected to be reduced as newly-planted riparian vegetation is established and loose soil is stabilized.

Because of the inherent biological characteristics of aquatic species such as MCR steelhead, the likelihood of discovering take attributable to this action is very limited. Take associated with the effects of actions such as these are largely unquantifiable in the short term, and may not be measurable as long-term effects on the species' habitat or population levels. Therefore, although NOAA Fisheries expects the habitat-related effects of these actions to cause some low level incidental take, the best scientific and commercial data available are not sufficient to enable NOAA Fisheries to estimate a specific amount of incidental take because of those habitat-related effects. In instances such as these, NOAA Fisheries designates the expected level of take as "unquantifiable."

In addition, incidental take is expected during the work isolation and fish relocation operation. Because of low flows, warm temperatures, and limited fish distribution within the Project area during the in-water work window, NOAA Fisheries expects very few fish to be present during project construction. Because few fish are expected to be present and the fish salvage operation is expected to cause very little direct mortality, the expected level of juvenile MCR steelhead killed should not exceed five individual juvenile steelhead per Project site.

This exemption from the take prohibition includes only take caused by the proposed action as described in the BA, within the action area as defined in this Opinion, and only through the end of calender year 2007.

2.2.2 Effect of Take

In this Opinion, NOAA Fisheries determines that this level of anticipated take is not likely to result in jeopardy to MCR steelhead.

2.2.3 Reasonable and Prudent Measures

NOAA Fisheries believes that the following reasonable and prudent measures are necessary and appropriate to minimize take of the above species. Minimizing the amount and extent of take is essential to avoid jeopardy to the listed species. The BPA in respect to their proposed or ongoing activities addressed in this Opinion, shall:

1. Avoid or minimize the amount and extent of take resulting from general construction activities, riparian disturbance, and in-water work required to complete the proposed Project addressed in this Opinion.

2. Avoid or minimize the likelihood of incidental take from contaminant leaks and spills associated with the use of heavy equipment into and within watercourses.

3. Avoid or minimize the amount and extent of incidental take resulting from fish salvage operations.

4. Monitor the effects of the proposed action to confirm this Opinion is achieving its objective of avoiding or minimizing take from permitted actions.

2.2.4 Terms and Conditions

To be exempt from the prohibitions of section 9 of the ESA, the action must be implemented in compliance with the following terms and conditions, which implement the reasonable and prudent measures described above for each category of activity. These terms and conditions are non-discretionary.

1. To implement reasonable and prudent measure #1 (general construction, riparian disturbance, and in-water work), the BPA shall ensure that:

    a. Minimum area. Confine construction impacts to the minimum area necessary to complete the Project.
    b. Timing of in-water work. Work below the bankfull elevation[4] will be completed using the most recent in-water work period (presently, July 1 to October 31), as appropriate for the Project area, unless otherwise approved in writing by NOAA Fisheries.

[4] 'Bankfull elevation' means the bank height inundated by a 1.5 to 2-year average recurrence interval and may be estimated by morphological features such average bank height, scour lines and vegetation limits.

c. Cessation of work. Cease Project operations under high flow conditions that may result in inundation of the Project area, except for efforts to avoid or minimize resource damage.

d. Preconstruction activity. Complete the following actions before significant[5] alteration of the Project area.

   i. Marking. Flag the boundaries of clearing limits associated with site access and construction to prevent ground disturbance of critical riparian vegetation, wetlands and other sensitive sites beyond the flagged boundary.

   ii. Emergency erosion controls. Ensure that for emergency erosion control are onsite.

   iii. Temporary erosion controls. All temporary erosion controls will be in-place and appropriately installed downslope of Project activity within the riparian area until site restoration is complete.

   iv. General erosion control. Practices to prevent erosion and sedimentation associated with access roads, stream crossings, drilling sites, construction sites, borrow pit operations, haul roads, equipment and material storage sites, fueling operations, staging areas, and roads being decommissioned.

   v. Inspection of erosion controls. During construction, monitor instream turbidity and inspect all erosion controls daily during the rainy season and weekly during the dry season, or more often as necessary, to ensure the erosion controls are working adequately.[6]

      (1) If monitoring or inspection shows that the erosion controls are ineffective, mobilize work crews immediately to make repairs, install replacements, or install additional controls as necessary.

      (2) Remove sediment from erosion controls once it has reached 1/3 of the exposed height of the control.

e. Heavy Equipment. When heavy equipment will be used, the equipment selected will have the least adverse effects on the environment (*e.g.*, minimally-sized, low ground pressure equipment).

f. Site preparation. Conserve native materials for site restoration.

   i. If possible, leave native materials where they are found.

   ii. If materials are moved, damaged or destroyed, replace them with a functional equivalent during site restoration.

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[5] 'Significant' means an effect can be meaningfully measured, detected or evaluated.

[6] 'Working adequately' means that Project activities do not increase ambient stream turbidity by more than 10% above background 100 feet below the discharge, when measured relative to a control point immediately upstream of the turbidity causing activity.

iii. Stockpile any large wood[7], native vegetation, weed-free topsoil, and native channel material displaced by construction for use during site restoration.

g. Earthwork. Complete earthwork (including drilling, excavation, dredging, filling and compacting) as quickly as possible.

i. Site stabilization. Stabilize all disturbed areas following any break in work unless construction will resume within four days.

ii. Source of materials. Obtain boulders, rock, woody materials and other natural construction materials used for the Project outside the riparian area.

h. Pesticides. Take of ESA-listed species caused by any aspect of pesticide use is not included in the exemption to the ESA take prohibitions provided by this incidental take statement. Pesticide use must be evaluated in an individual consultation, although mechanical or other methods may be used to control weeds and unwanted vegetation.

i. Fertilizer. Do not apply surface fertilizer within 50 feet of any stream channel.

2. To implement reasonable and prudent measure #2 (pollution control), the BPA shall ensure that:

a. Pollution Control Plan. Prepare and carry out a pollution and erosion control plan to prevent pollution caused by surveying or construction operations. The plan must be available for inspection on request by NOAA Fisheries.

i. Plan Contents. The pollution and erosion control plan will contain the pertinent elements listed below, and meet requirements of all applicable laws and regulations.

(1) The name and address of the party(s) responsible for accomplishment of the pollution and erosion control plan.

(2) Practices to confine, remove and dispose of excess concrete, cement, grout, and other mortars or bonding agents, including measures for washout facilities.

(3) A description of any regulated or hazardous products or materials that will be used for the Project, including procedures for inventory, storage, handling, and monitoring.

(4) A spill containment and control plan with notification procedures, specific cleanup and disposal instructions for different products, quick response containment and cleanup measures that will be available on the site, proposed methods for disposal of spilled materials, and employee training for spill containment.

[7] For purposes of this Opinion only, 'large wood' means a tree, log, or rootwad big enough to dissipate stream energy associated with high flows, capture bedload, stabilize streambanks, influence channel characteristics, and otherwise support aquatic habitat function, given the slope and bankfull channel width of the stream in which the wood occurs. See, Oregon Department of Forestry and Oregon Department of Fish and Wildlife, *A Guide to Placing Large Wood in Streams*, May 1995 (www.odf.state.or.us/FP/RefLibrary/LargeWoodPlacemntGuide5-95.doc).

(5) Practices to prevent construction debris from dropping into any stream or waterbody, and to remove any material that does drop with a minimum disturbance to the streambed and water quality.

ii. Vehicle and material staging. Store construction materials, and fuel, operate, maintain and store vehicles as follows.

(1) To reduce the staging area and potential for contamination, ensure that only enough supplies and equipment to complete a specific job will be stored on-site.

(2) Complete vehicle staging, cleaning, maintenance, refueling, and fuel storage in a vehicle staging area placed outside of any riparian areas, unless otherwise approved in writing by NOAA Fisheries.

(3) Inspect all vehicles operated within an riparian areas daily for fluid leaks before leaving the vehicle staging area. Repair any leaks detected in the vehicle staging area before the vehicle resumes operation. Document inspections in a record that is available for review on request by NOAA Fisheries.

(4) Before operations begin and as often as necessary during operation, steam clean all equipment that will be used below bankfull elevation until all visible external oil, grease, mud, and other visible contaminates are removed.

(5) Diaper all stationary power equipment (*e.g.*, generators, cranes, stationary drilling equipment) operated within any riparian area to prevent leaks, unless suitable containment is provided to prevent potential spills from entering any stream or waterbody.

b. Floating Boom. An oil-absorbing, floating boom whenever surface water is present.

c. Construction discharge water. Treat all discharge water created by construction (*e.g.*, concrete washout, pumping for work area isolation, vehicle wash water, drilling fluids) as follows:

i. Water quality. Design, build and maintain facilities to collect and treat all construction discharge water using the best available technology applicable to site conditions. Provide treatment to remove debris, nutrients, sediment, petroleum hydrocarbons, metals and other pollutants likely to be present.

ii. Discharge velocity. If construction discharge water is released using an outfall or diffuser port, velocities may not exceed 4 feet per second, and the maximum size of any aperture may not exceed one inch.

iii. Pollutants. Do not allow pollutants including green concrete, contaminated water, silt, welding slag, sandblasting abrasive, or grout cured less than 24 hours to contact any wetland or the two-year floodplain.

3. To implement reasonable and prudent measure #3 (fish salvage), the BPA shall ensure that:

a. Fish screens. Have a fish screen installed, operated and maintained according to NOAA Fisheries' fish screen criteria[8] on each water intake used for Project construction, including pumps used to isolate an in-water work area. Screens for water diversions or intakes that will be used for irrigation, municipal or industrial purposes, or any use besides Project construction are not authorized.

b. Capture and release. Use the following protocols during fish salvage:

i. Fish Handling and Transfer Protocols – Fish Capture Alternatives . Where the capture, removal, and relocation of ESA-listed fish are required, the BPA shall:

(1) Have a fisheries biologist experienced with work area isolation and competent to ensure the safe handling of all ESA-listed fish conduct or supervise the operation

(2) Use one or combination of the following methods to most effectively capture ESA-listed fish and minimize harm.

(a) Hand Netting. Collect fish by hand or dip nets, as the area is slowly dewatered.

(b) Seining. Seine using a net with mesh of such a size as to ensure entrapment of the residing ESA-listed fish.

(c) Minnow Trap. Place minnow traps overnight and in conjunction with seining.

(3) Fish Storage and Release. Where the capture, removal, and relocation of ESA-listed fish are required the BPA shall:

(a) Handle captured fish with extreme care and keep these fish in water to the maximum extent possible for the least amount of time during transfer procedures. The use of a sanctuary net is recommended.[9]

(b) Utilize large buckets (five-gallon or greater) and minimize the number of fish stored in each bucket to prevent overcrowding

(c) Place large fish in buckets separate from smaller prey-sized fish.

(d) Monitor water temperature in buckets and well-being of captured fish.

(e) Release fish upstream of the isolated reach in a pool or area that provides cover and flow refuge after fish have recovered from stress of capture.

(f) Document all fish injuries or mortalities.

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[8] National Marine Fisheries Service, *Juvenile Fish Screen Criteria* (revised February 16, 1995) and *Addendum: Juvenile Fish Screen Criteria for Pump Intakes* (May 9, 1996) (guidelines and criteria for migrant fish passage facilities, and new pump intakes and existing inadequate pump intake screens) (http://www.nwr.noaa.gov/1hydrop/hydroweb/ferc.htm).

[9] A sanctuary net is a net that has a solid bottom bag that allows for the retention of a small amount of water in the net, thus allowing for less potential impact to netted fish from the net mesh.

(4) Electroshocking If electroshockers are used follow NOAA Fisheries guidelines for electroshocking (Appendix C)

4. To implement reasonable and prudent measure #4 (monitoring), the BPA shall:

a. Reporting. Within one year of Project completion, the BPA will submit a monitoring report to NOAA Fisheries describing the BPA's success in meeting the terms and conditions contained in this Opinion. The monitoring report will include the following information.

i. Project identification
   (1) Project name.
   (2) Type of activity.
   (3) Project location, by 5th field HUC and by latitude and longitude as determined from the appropriate USGS 7-minute quadrangle map.
   (4) BPA contact person.
   (5) Starting and ending dates for work completed.

ii. Photo documentation. Photos of habitat conditions at the Project and any compensation site(s), before, during, and after Project completion.[10]
   (1) Include general views and close-ups showing details of the Project and Project area, including pre and post construction.
   (2) Label each photo with date, time, Project name, photographer's name, and a comment about the subject.

iii. Other data. Additional Project-specific data, as appropriate.
   (1) Work cessation. Dates work ceased due to high flows, if any.
   (2) Fish screen. Evidence of compliance with NOAA Fisheries' fish screen criteria.
   (3) Pollution control. A summary of pollution and erosion control inspections, including any erosion control failure, contaminant release, and correction effort.
   (4) Site preparation.
      (a) Total cleared area – riparian and upland.
      (b) Total new impervious area.
   (5) Isolation of in-water work area, capture and release.
      (a) Supervisory fish biologist – name and address.
      (b) Methods of work area isolation and take minimization.
      (c) Stream conditions before, during and within one week after completion of work area isolation.
      (d) Means of fish capture.
      (e) Number of MCR steelhead captured.
      (f) Location and condition of all fish released.

[10] Relevant habitat conditions may include characteristics of channels, eroding and stable streambanks in the Project area, riparian vegetation, water quality, flows at base, bankfull and over-bankfull stages, and other visually discernable environmental conditions at the Project area, and upstream and downstream of the Project.

(g) Any incidence of observed injury or mortality of listed species.

(6) Site restoration. Photo or other documentation that site restoration performance standards were met.

b. Physical Channel Alteration. Provide information, including photographs, summarizing the effectiveness of the Project design in meeting the Project goals. If any Projects elements fail, provide information on the effects of this failure to MCR steelhead habitat and stream channel morphology.

c. Effectiveness monitoring. Gather any other data or analyses the BPA or ODFW deems necessary or helpful to complete an assessment of habitat trends in stream and riparian conditions as a result of this Project. The BPA or ODFW may use existing monitoring efforts for this purpose if those efforts can provide information specific to the objective of identifying habitat trends.

d. Notice. If a sick, injured, or dead specimen of a threatened or endangered species is found, the finder must notify the Vancouver Field Office of NOAA Fisheries Law Enforcement at (360) 418-4246. The finder must take care in handling sick or injured specimens to ensure effective treatment, and in handling dead specimens to preserve biological material in the best possible condition for later analysis of cause of death. The finder also has the responsibility to carry out instructions provided by Law Enforcement to ensure that evidence intrinsic to the specimen is not disturbed unnecessarily.

e. Report submission. Submit a copy of the report to the Oregon State Habitat Office of NOAA Fisheries.

Director, Oregon State Habitat Office
Habitat Conservation Division
National Marine Fisheries Service
Attn: 2003/00778
525 NE Oregon Street
Portland, OR 97232

3. MAGNUSON-STEVENS ACT

3.1 Magnuson-Stevens Fishery Conservation and Management Act

The MSA, as amended by the Sustainable Fisheries Act of 1996 (Public Law 104-267), requires the inclusion of EFH descriptions in Federal fishery management plans. In addition, the MSA requires Federal agencies to consult with NOAA Fisheries on activities that would adversely affect EFH.

EFH means those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity (MSA §3). For the purpose of interpreting the definition of EFH: "Waters" include aquatic areas and their associated physical, chemical, and biological properties that are

used by fish and may include aquatic areas historically used by fish where appropriate; "substrate" includes sediment, hard bottom, structures underlying the waters, and associated biological communities; "necessary" means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and "spawning, breeding, feeding, or growth to maturity" covers a species' full life cycle (50CFR600.110).

Section 305(b) of the MSA (16 U.S.C. 1855(b)) requires that:

- Federal agencies must consult with NOAA Fisheries on all actions, or proposed actions, authorized, funded, or undertaken by the agency, that may adversely affect EFH;

- NOAA Fisheries shall provide conservation recommendations for any Federal or state Activity that may adversely affect EFH;

- Federal agencies shall within 30 days after receiving conservation recommendations from NOAA Fisheries provide a detailed response in writing to NOAA Fisheries regarding the conservation recommendations. The response shall include a description of measures proposed by the agency for avoiding, mitigating or offsetting the impact of the activity on EFH. In the case of a response that is inconsistent with the conservation recommendations of NOAA Fisheries, the Federal agency shall explain its reason for not following the recommendations.

The MSA requires consultation for all actions that may adversely affect EFH, and does not distinguish between actions within EFH and actions outside EFH. Any reasonable attempt to encourage the conservation of EFH must take into account actions that occur outside EFH, such as upstream and upslope activities, that may have an adverse effect on EFH. Therefore, EFH consultation with NOAA Fisheries is required by Federal agencies undertaking, permitting or funding activities that may adversely affect EFH, regardless of its location.

3.2 Identification of EFH

The Pacific Fisheries Management Council (PFMC) has designated EFH for three species of Pacific salmon: Chinook (*Oncorhynchus tshawytscha*); coho (*O. kisutch*); and Puget Sound pink salmon (*O. gorbuscha*) (PFMC 1999). Freshwater EFH for Pacific salmon includes all those streams, lakes, ponds, wetlands, and other waterbodies currently, or historically accessible to salmon in Washington, Oregon, Idaho, and California, except areas upstream of certain impassable man-made barriers (as identified by the PFMC), and longstanding, naturally-impassable barriers (*i.e.*, natural waterfalls in existence for several hundred years). Detailed descriptions and identifications of EFH for salmon are found in Appendix A to Amendment 14 to the *Pacific Coast Salmon Plan* (PFMC 1999). Assessment of potential adverse effects to these species' EFH from the proposed action is based on this information.

3.3 Proposed Actions

The proposed action is detailed above in section 1.2 of the ESA portion of this Opinion. The action area is within the Trout Creek subbasin. This area has been designated as EFH for various life stages of chinook salmon and coho salmon.

3.4 Effects of Proposed Action

The effects on chinook and coho salmon are the same as those for MCR steelhead and are described in detail in section 2.2.1 of this document, the proposed action may result in short-term and long-term adverse effects on a variety of habitat parameters. These adverse effects are:

1. Riparian disturbance from accessing construction area and construction activities performed from the bank.
2. Increased sedimentation from instream construction activities.
3. Petroleum leaks or spills.

3.5 Conclusion

NOAA Fisheries believes that the proposed action will adversely affect the EFH for chinook and coho salmon.

3.6 EFH Conservation Recommendations

Pursuant to section 305(b)(4)(A) of the MSA, NOAA Fisheries is required to provide EFH conservation recommendations for any Federal or state agency action that would adversely affect EFH. In addition to conservation measures proposed for the Project by the BPA, all of the reasonable and prudent measures and the terms and conditions contained in sections 2.2.3 and 2.2.4 (respectively) of the ESA portion of this Opinion are applicable to salmon EFH. Therefore, NOAA Fisheries incorporates each of those measures here as EFH conservation recommendations.

3.7 Statutory Response Requirement

The MSA (section 305(b)) and 50 CFR 600.920(j) requires the BPA to provide a written response to NOAA Fisheries' EFH conservation recommendations within 30 days of its receipt of this letter. The response must include a description of measures proposed to avoid, mitigate, or offset the adverse impacts of the activity on EFH. If the response is inconsistent with NOAA Fisheries' conservation recommendations, the reasons for not implementing the BPA shall explain its reasons for not following the recommendations.

3.8 Supplemental Consultation

The BPA must reinitiate EFH consultation with NOAA Fisheries if either the action is substantially revised or new information becomes available that affects the basis for NOAA Fisheries' EFH conservation recommendations (50 CFR 600.920).

4. LITERATURE CITED

Berg, L. and T.G. Northcote. 1985. "Changes In Territorial, Gill-Flaring, and Feeding Behavior in Juvenile Coho Salmon (*Oncorhynchus kisutch*) Following Short-Term Pulses of Suspended Sediment." Canadian Journal of Fisheries and Aquatic Sciences 42:1410-1417.

Birtwell, I. K., G. F. Hartman, B. Anderson, D. J. McLeay and J. G. Malick. 1984. A brief investigation of Arctic Grayling (*Thymallus arcticus*) and aquatic invertebrates in the Minto Creek drainage, Mayo, Yukon Territory: an area subjected to placer mining. Canadian Technical Report of Fisheries and Aquatic Sciences 1287.

Bjornn, T.C., and D.W. Reiser. 1991. Habitat requirements of salmonids in streams. Pages 83-138, in W.R. Meehan (editor) Influences of forest and rangeland management on salmonid fishes and their habitats. Special Publication 19. American Fisheries Society, Bethesda, Maryland.

Brookes, A. 1987. Restoring the sinuosity of artificially straightened stream channels. Environmental Geological Water Science. 10(1): 33-41

Brookes, A. 1990. Restoration and enhancement of engineered river channels: Some European Experiences. Regulated Rivers: Research and Management. 5: 45-56.

Busby, P., T. Wainwright, G.J. Bryant, L.J. Lierheimer, R.S. Waples, and I.V. Lagomarsino. 1996. Status review of west coast steelhead from Washington, Idaho, Oregon, and California.

Coutant, C.C. 1999. Perspectives on Temperature in the Pacific Northwest's Fresh Waters. Environmental Sciences Division Publication 4849 (ORNL/TM-1999/44), Oak Ridge National Laboratory, Oak Ridge, Tennessee. 108 p.

DeVore, P. W., L. T. Brooke and W. A. Swenson. 1980. The effects of red clay turbidity and sedimentation on aquatic life in the Nemadji River system. Impact of nonpoint pollution control on western Lake Superior. S. C. Andrews, R. G. Christensen, and C. D. Wilson. Washington, D.C., U.S. Environmental Protection Agency. EPA Report 905/9-79-002-B.

Federal Caucus. 2000. Conservation of Columbia Basin Fish: Final Basinwide Salmon Recovery Strategy. <http://www.salmonrecovery.gov> December.

Gregory, R.S. 1993. Effect of turbidity on the predator avoidance behavior of juvenile chinook salmon (*Oncorhynchus tshawytscha*). Canadian J. Fish. Aquatic Sciences 50:241-246.

Gregory, R.S., and C.D. Levings. 1998. Turbidity reduces predation on migrating juvenile pacific salmon. Transactions of the American Fisheries Society 127: 275-285.

Henjum, M.G., J.R. Karr, D.L. Bottom, D.A. Perry, J.C. Bednarz, S.G. Wright, S.A. Beckwitt and E. Beckwitt. 1994. Interim Protection for Late-successional Forests, Fisheries and Watersheds. National Forests East of the Cascade Crest, Oregon and Washington. A Report to the United States Congress and the President. The Wildlife Society, Bethesda, MD.

House, R.A. and P.L. Boehne. 1986. Effects of instream structures on salmonid habitat and populations in Tobe Creek, Oregon. North American Journal of Fisheries Management. 6(1): 38-46.

Independent Scientific Group. 1996. Return to the River: Restoration of Salmonid Fishes in the Columbia River Ecosystem. Northwest Power Planning Council. Portland, Oregon. 500p.

Lee, D. C., J. R. Sedell, B. E. Rieman, R. F. Thurow, and J. E. Williams. 1997. Broadscale Assessment of Aquatic Species and Habitats. Volume III, Chapter 4. U.S. For. Serv., Gen. Tech. Rep. PNW-GTR-405. Portland, Oregon.

Lloyd, D.S. 1987. Turbidity as a water quality standard for habitats in Alaska. North American Journal of Fisheries Management 7:34-35.

Lloyd, D. S., J. P. Koenings, and J. D. LaPerriere. 1987. Effects of turbidity in fresh waters of Alaska. North American Journal of Fisheries Management 7: 18-33.

Maser, Chris & James R. Sedell. 1994. From the Forest to the Sea: The Ecology of Wood in Streams, Rivers, Estuaries, and Oceans. St. Lucie Press, Delray Beach, Florida.

McLeay, D. J., G. L. Ennis, I. K. Birtwell, and G. F. Hartman. 1984. Effects On Arctic Grayling (*Thymallus arcticus*) of Prolonged Exposure to Yukon Placer Mining Sediment: A Laboratory Study. Canadian Technical Report of Fisheries and Aquatic Sciences 1241.

McLeay, D. J., I. K. Birtwell, G. F. Hartman, and G. L. Ennis. 1987. Responses of Arctic Grayling (*Thymallus arcticus*) To Acute and Prolonged Exposure to Yukon Placer Mining Sediment. Canadian Journal of Fisheries and Aquatic Sciences 44: 658-673

National Research Council. 1996. Upstream—Salmon and Society in the Pacific Northwest. National Academy Press, Washington, D.C.

Neff, J.M. 1985. Polycyclic aromatic hydrocarbons. *In*: Fundamentals of aquatic toxicology, G.M. Rand and S.R. Petrocelli, pp. 416-454. Hemisphere Publishing, Washington, D.C.

Nehlsen, W. 1997. Prioritizing Watersheds in Oregon for Salmon Restoration. Restoration Ecology 5(4S):25-43.0

Nelson, Tom. 2000. Trout Creek Redd Count Survey. Unpublished Data. Oregon Department of Fish and Wildlife, Madras, Oregon. 2000.

Nelson, Tom. 2001. Trout Creek Redd Count Survey. Unpublished Data. Oregon Department of Fish and Wildlife, Madras, Oregon. 2001.

Newcombe, C. P., and D. D. MacDonald. 1991. Effects of Suspended Sediments on Aquatic Ecosystems." North American Journal of Fisheries Management 11: 72-82.

NOAA Fisheries 1996. Making Endangered Species Act Determinations of Effect for Individual and Grouped Actions at the Watershed Scale. Habitat Conservation Program, Portland, Oregon.

NOAA Fisheries (National Marine Fisheries Service) 1996b. Factors for decline: A supplement to the notice of determination for West Coast Steelhead under the Endangered Species Act. NOAA Fisheries, Protected Species Branch, Portland, Oregon, 83p. (Available from NOAA Fisheries Protected Resources Division, 525 N.E. Oregon Street, Portland, Oregon 97232).

NOAA Fisheries 1999. The Habitat Approach. Implementation of Section 7 of the Endangered Species Act for Actions Affecting the Habitat of Pacific Anadromous Salmonids. Northwest Region, Habitat Conservation and Protected Resources Divisions, August 26.

NOAA Fisheries 2000a. Biological Opinion -- Reinitiation of Consultation on Operation of the Federal Columbia River Power System, Including the Juvenile Fish Transportation Program, and 19 Bureau of Reclamation Projects in the Columbia Basin. Hydro Program, Portland, Oregon. (Issued December 21, 2000)

NOAA Fisheries. 2000b. Biological Opinion-- Bull Trout Sampling Program Throughout Washington. July 28, 2000.

NOAA Fisheries (*in review*). 2003. Preliminary conclusions regarding the updated status of listed ESUs of West Coast salmon and steelhead. 142 pages. February. NOAA Fisheries, 525 NE Oregon Street, Suite 500, Portland, Oregon 97232-2737. (Available @ www.nwfsc.noaa.gov/)

Oregon Department of Fish and Wildlife (ODFW). 2000. Guidelines for Timing of Inwater Work to Protect Fish and Wildlife Resources, 12 pp. June 2000.

Oregon Progress Board. 2000. Oregon State of the Environment Report 2000. Oregon Progress Board, Salem, Oregon.

PFMC 1999. Amendment 14 to the Pacific Coast Salmon Plan. Appendix A: Description and Identification of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon. Pacific Fishery Management Council, Portland, Oregon.

Platts, W. S. 1991. Livestock grazing. pp. 389-424 in Meehan, ed., Influences of Forest and Rangeland Management on Salmonid Fishes and Their Habitats. American Fisheries Soc., Bethesda, Maryland. 751 p.

Redding, J. M., C. B. Schreck, and F. H. Everest. 1987. Physiological Effects on Coho Salmon and Steelhead of Exposure to Suspended Solids. Transactions of the American Fisheries Society 116: 737-744.

Rhodes, J.J., D.A. McCullough, and F.A. Espinosa, Jr. 1994. A Coarse Screening Process for Potential Application in ESA Consultations. Columbia River Intertribal Fish Commission. Prepared under NOAA Fisheries/BIA Inter-Agency Agreement 40ABNF3. December.

Rinaldi M. and P.A. Johnson. 1997. Stream meander restoration. Journal of the Water Resources Association. 33(4): 855-866.

Roper, B.B. D. Konnoff, D. Heller, and Ken Weiman. 1998. Durability of Pacific Northwest Instream Structures Following Floods. North American Journal of Fisheries Management 18: 686-693.

Rosgen, D. 1996. Applied River Morphology. Wildland Hydrology. Pagosa Springs, Colorado.

Sampson. R. 2001. Restoring stream channel meanders: Planning, implementations, and cautions. The McCoy Creek example. *In:* Proceeding of the Watershed Restoration Workshop. Amercian Fisheries Society, Oregon Chapter. Eugene Oregon, November 13-15.

Scannell, P.O. 1988. Effects of elevated sediment levels from placer mining on survival and behavior of immature arctic grayling. Alaska Cooperative Fishery Unit, University of Alaska. Unit Contribution 27.

Sedell, J.R. and J.L. Froggatt. 1984. Importance of Streamside Forests to Large Rivers: The Isolation of theWillamette River, Oregon, USA, from Its Floodplain by Snagging and Streamside Forest Removal. Internationale Vereinigung fur theoretische und angewandte Limnologie Verhandlungen 22:1828-1834.

Servizi, J. A. and Martens, D. W. 1991. Effects of temperature, season, and fish size on acute lethality of suspended sediments to coho salmon. Canadian Journal of Fisheries and Aquatic Sciences 48:493:497.

Sigler , J. W., T.C. Bjorn and F.H. Everest. 1984. Effects of chronic turbidity on density and growth of steelheads and coho salmon. Trans. Am. Fish. Soc. 111:63-69.

Spence, B.C, G.A. Lomnicky, R.M. Hughes, R.P. Novitzki. 1996. An Ecosystem Approach to Salmonid Conservation. TR-4501-96-6057. ManTech Environmental Research Services Corp., Corvallis, OR.

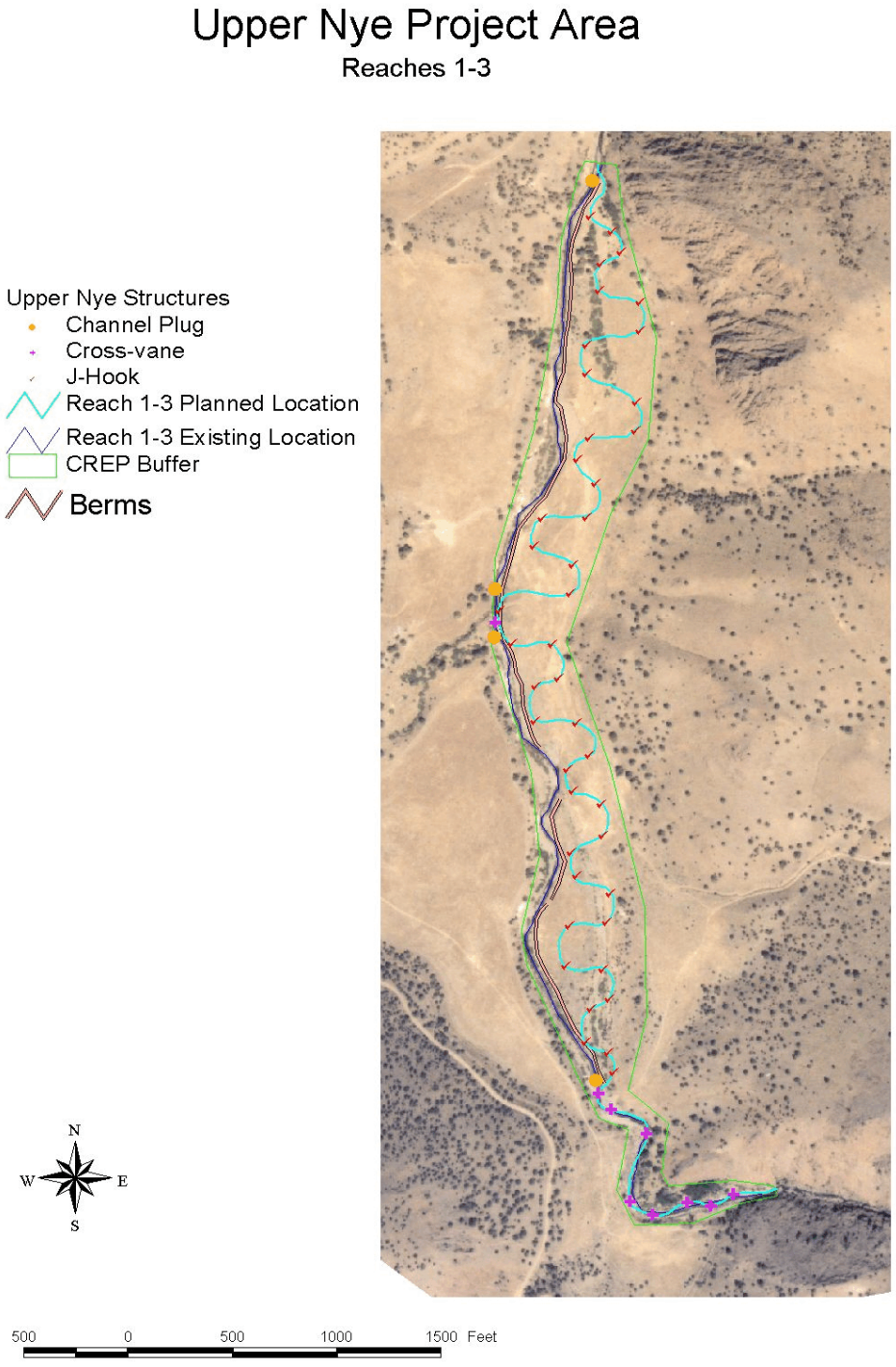
Watershed Professionals Network. 2002. Trout Creek Watershed Assessment. Corvallis, OR. 322p.

Wedemeyer, G.A., B.A. Barton, and D.J. McLeay. 1990. Stress and acclimation. Pages 451-490 *in* C.B. Schreck and P.B. Moyle, editors. Methods for fish biology. American Fisheries Society, Bethesda, Maryland.

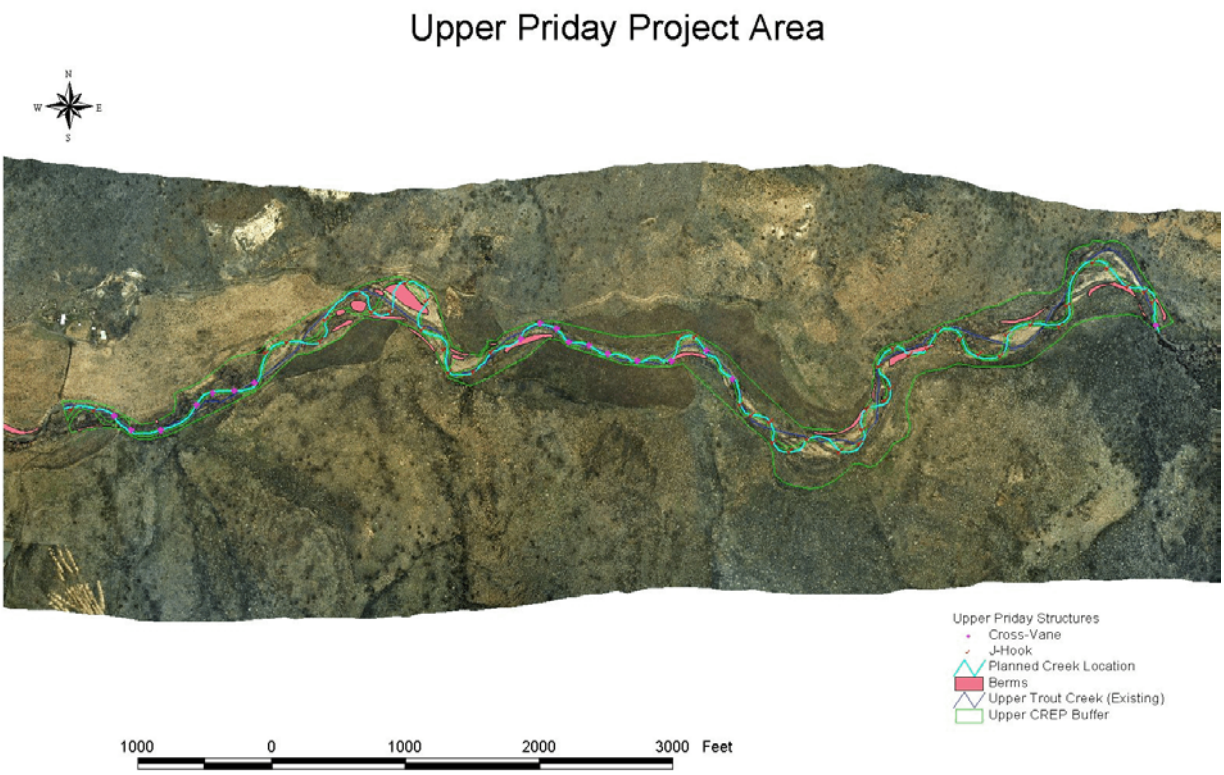
Whitman, R.P., T.P. Quinn and E.L. Brannon. 1982. Influence of suspended volcanic ash on homing behavior of adult chinook salmon. Trans. Am. Fish. Soc. 113:142-150.

Wissmar, R.C., J.E. Smith, B.A. McIntosh, H.W. Li, G.H. Reeves, and J.R. Sedell. 1994. Ecological Health of River Basins in Forested Regions of Eastern Washington and Oregon. Gen. Tech. Rep. PNW-GTR-326. U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Portland, OR. 65 p.

Appendix A. Maps of the Project Areas (Reprinted from BPA BA)



Appendix A (cont.) Maps of the Project Areas (Reprinted from BPA BA)



Appendix B. Timeline for Project Implementation

Activity	Scheduled Time for Implementation
Phase 1 Nye Site (Falls to Canyon RM 39-40)	
Haul rock to site of instream structures	Winter/Spring, 2003-4
Construct new channel and reshape floodplain (above ordinary high water mark)	Winter/Spring, 2003-4
Construct new channel and reshape floodplain (below ordinary high water mark)	July-October, 2004
Install instream structures	July-October, 2004
Re-seed disturbed areas, construct livestock exclosure fence	November-December, 2004
Allow water into new stream channel	November-December, 2004
Plant riparian hardwood shrubs	March-April, 2005
Phase 2 Nye Site (Canyon to Bridge RM 38-39)	
Haul rock to site of instream structures	Winter/Spring, 2004-5
Construct new channel and reshape floodplain (above ordinary high water mark)	Winter/Spring, 2004-5
Construct new channel and reshape floodplain (below ordinary high water mark)	July-October, 2005
Install instream structures	July-October, 2005
Re-seed disturbed areas, construct livestock exclosure fence	November-December, 2005
Allow water into new stream channel	November-December, 2005
Plant riparian hardwood shrubs	March-April, 2006
Phase 3 Nye Site (Bridge to Boundary RM 36-38)	
Haul rock to site of instream structures	Winter/Spring, 2005-6
Construct new channel and reshape floodplain (above ordinary high water mark)	Winter/Spring, 2005-6
Construct new channel and reshape floodplain (below ordinary high water mark)	July-October, 2006
Install instream structures	July-October, 2006
Re-seed disturbed areas, construct livestock exclosure fence	November-December, 2006
Allow water into new stream channel	November-December, 2006
Plant riparian hardwood shrubs	March-April, 2007

Activity	Scheduled Time for Implementation
Phase 1 Priday Site (Degner Canyon to Rock Cliff RM 13-14)	
Haul rock to site of instream structures	Winter/Spring, 2003-4
Construct new channel and reshape floodplain (above ordinary high water mark)	Winter/Spring, 2003-4
Construct new channel and reshape floodplain (below ordinary high water mark)	July-October, 2004
Install instream structures	July-October, 2004
Re-seed disturbed areas, construct livestock exclosure fence	November-December, 2004
Allow water into new stream channel	November-December, 2004
Plant riparian hardwood shrubs	March-April, 2005
Phase 2 Priday Site (Rock Cliff upper IG RM 12-13)	
Haul rock to site of instream structures	Winter/Spring, 2004-5
Construct new channel and reshape floodplain (above ordinary high water mark)	Winter/Spring, 2004-5
Construct new channel and reshape floodplain (below ordinary high water mark)	July-October, 2005
Install instream structures	July-October, 2005
Re-seed disturbed areas, construct livestock exclosure fence	November-December, 2005
Allow water into new stream channel	November-December, 2005
Plant riparian hardwood shrubs	March-April, 2006
Phase 3 Priday Site (Upper IG to Antelope Creek RM 10-12)	
Haul rock to site of instream structures	Winter/Spring, 2004-5
Construct new channel and reshape floodplain (above ordinary high water mark)	Winter/Spring, 2004-5
Construct new channel and reshape floodplain (below ordinary high water mark)	July-October, 2005
Install instream structures	July-October, 2005
Re-seed disturbed areas, construct livestock exclosure fence	November-December, 2005
Allow water into new stream channel	November-December, 2005
Plant riparian hardwood shrubs	March-April, 2006

Appendix C. NOAA Fisheries Electrofishing Guidelines (NOAA Fisheries 2000b)

ELECTROFISHING GUIDELINES

Suggested protocol for the use of backpack electrofishing equipment in waters containing fish listed under the Endangered Species Act (ESA). These recommendations should be seen as guidelines for developing consistent and safe electrofishingtechnique. It is hoped that these guidelines will ultimately help improve electrofishing technique in ways which will reduce fish injury and increase electrofishing efficiency.

Purpose and Scope

The purpose of this document is to recommend guidelines for using backpack electrofishing equipment to sample ESA-listed fish. Because electrofishing can kill or severely injure fish, every effort should be made to avoid electrofishing and use snorkeling or other fishery information collection techniques. Where electrofishing is the only suitable sampling method, these guidelines are suggested to help reduce the number of fish killed or severely injured. These guidelines are concerned only with studies that involve electrofishing juvenile or adult salmonids that are not in spawning condition. Electrofishing in the vicinity of adults in spawning condition or operating equipment in the vicinity of redds containing developing eggs is not discussed, as there is no justifiable basis for permitting these activities near listed species. Also, these guidelines do not deal with factors such as temperature or fish handling technique, both of which can significantly affect fish health during an electrofishing session. None the less, all ESA-listed fish must be sampled with extreme care. The field crew must carefully design the sampling sessions tominimize fish stress by working within favorable temperature regimes, using anesthetics when necessary, and minimizing the time the fish are held before release. As with all fieldwork involving live ESA-listed fish, the best science should be used along with an experienced crew and good equipment to minimize handling stress.

Equipment

Equipment should be in good working condition. Operators should go through the manufacturer's preseason checks, adhere to all provisions, and record major maintenance work in a log.

Training

A crew leader having at least 100 hours of electrofishing experience in the field using similar equipment should train the crew. The crew leader’s experience must be documented and available for confirmation; such documentation may be in the form of a logbook. The training should occur before an inexperienced crew begins any electrofishing, and it should be conducted in waters that do **not** contain ESA-listed fish.

The training program must include the following elements:

1. Definitions of basic terminology (*e.g.* galvanotaxis, narcosis, and tetany).

2. An explanation of how electrofishing attracts fish.

3. An explanation of how gear can injure fish and how to recognize signs of injury.

4. A review of these guidelines and the manufacturer's recommendations.

5. A demonstration of the proper use of electrofishing equipment, the role each crew member performs, and basic gear maintenance.

6. A field session where new individuals actually perform each role on the electrofishing crew.

Specific Electrofishing Guidelines

1. To avoid contact with spawning adults or active redds, carefully survey the area to be sampled before beginning electrofishing.

2. Measure conductivity and set voltage as follows:

Conductivity (umhos/cm)	Voltage
Less than 100	900 to 1100
100 to 300	500 to 800
Greater than 300	150 to 400

3. Only direct current (DC) should be used.

4. Each session should begin with pulse width and rate set to the minimum needed to capture fish. These settings should be gradually increased only to the point where fish are immobilized and captured. Start with pulse width of 500 us and do not exceed 5 milliseconds. Pulse rate should start at 30Hz and work carefully upwards. In general, exceeding 40 Hz will injure more fish.

5. The zone of potential fish injury is 0.5m from the anode. Care should be taken in shallow waters, undercut banks, or where fish can be concentrated because in such areas the fish are more likely to come into close contact with the anode.

6. The stream segment should be worked systematically, moving the anode continuously in a herringbone pattern through the water. Do not electrofish one area for an extended period.

7. Crew should carefully observe the condition of the sampled fish. Dark bands on the body and longer recovery times are signs of injury or handling stress. When such signs are noted, the settings for the electrofishing unit may need adjusting. Sampling should be terminated if injuries occur or abnormally long recovery times persist.

8. When the sampling design involves taking scales and measurements, a healthy environment for the stressed fish must be provided and the holding time must be minimized. For these operations, additional crew members who are experienced in holding and processing stressed fish may be necessary.

9. Whenever possible, a block net should be placed below the area being sampled to capture stunned fish that may drift downstream.

10. The electrofishing settings should be recorded in a logbook along with conductivity, temperature, and other variables affecting efficiency. These notes, together with observations on fish condition, will improve technique and form the basis for training new operators.